

**REMARKS**

Claims 1-5, 8-11, 14-17, 20-23, 26-29, 32-35, and 37-39 are presented for examination, claims 6, 7, 12, 13, 18, 19, 24, 25, 30, 31, and 36 having been withdrawn from consideration. Claims 1, 8, 14, 20, 26, and 32 are independent.

Applicants amend claims 1, 8, 14, 20, 26, and 32 herein. No new matter is added. Support for the amendments can be found throughout the Specification and Figures as originally filed, and specifically in the Specification at page 10, line 4 through page 11, line 26 and in Figure 3A. Applicants respectfully submit that the pending claims are in condition for allowance.

Applicants thank the Examiner for withdrawing the 35 U.S.C. §102 rejections of claims 1-5, 8-11, 14-17, 20-23, 26-29, 32-35, and 37-39 (Office Action at pages 2-3).

**Claim Rejections under 35 U.S.C. §103(a)**

In the Office Action:

claims 1-5, 8-11, 14-17, 20-23, 26-29, and 32-35 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sauro et al., Omics: A Journal of Integrative Biology, Vol. 7, No. 4, 2003 (hereafter “Sauro”) in view of Kurata et al., Nucleic Acids Research, Vol. 31, No. 14, p.4071-4084, 2003 (hereafter “Kurata”) (See the Office Action, page 4); and

claims 37-39 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sauro in view of Kurata, and further in view of Shannon et al., Genome research, Vol. 13, p. 2498-2504, 2003 (hereafter “Shannon”) and in view of *Presentation of Biospice*, DARPA BioComp, May 2002 (hereafter “Biospice”) (See the Office Action, page 5).

Applicants respectfully traverse the rejections.

**Claims 1-5**

Applicants’ claim 1 recites:

1. A system for improved modeling of a biological system that comprises a plurality of chemical reactions, the system comprising:

a modeling component comprising a graphical user interface for accepting user commands and input to construct a model of the biological system, the model being represented in a tabular view and a graphical view, *the tabular view being adapted to receive the user commands and input to construct the model and display at least one of the plurality of chemical reactions, the tabular view comprising a reaction table that depicts the plurality of chemical reactions and a species table that depicts at least one initial condition and at least one amount of material used in the modeled biological system;*

a simulation engine accepting as input the constructed model of the biological system and generating as output dynamic behavior of the biological system; and

an analysis environment in communication with the simulation engine, the analysis environment displaying dynamic behavior of the biological system.

Applicants respectfully urge that Sauro and Kurata, alone or in any reasonable combination, do not disclose or suggest at least a *tabular view being adapted to receive the user commands and input to construct the model and display at least one of the plurality of chemical reactions, the tabular view comprising a reaction table that depicts the plurality of chemical reactions and a species table that depicts at least one initial condition and at least one amount of material used in the modeled biological system*, which is present in Applicants' claim 1.

In order to clarify the tabular view of claim 1, Applicants amend claim 1 to recite that the tabular view comprises *a reaction table that depicts the plurality of chemical reactions and a species table that depicts at least one initial condition and at least one amount of material used in the modeled biological system*. Neither Sauro nor Kurata discloses or suggests a reaction table and a species table in a tabular view.

The Examiner points to Figure 12 of Sauro as a tabular view. However, Figure 12 depicts "all the elementary modes that METATOOL found for the displayed model" (Sauro at page 366, first paragraph, lines 3-4, *emphasis added*). An elementary mode is the smallest sub-network of a metabolic reconstruction network that allows the network to function in steady state (see, e.g., Trinh, Wlaschin, and Srienc, *Elementary Node Analysis: A Useful Metabolic Pathway Analysis Tool for Characterizing Cellular Metabolism*, *Appl Microbiology*

Biotechnology vol. 81, pages 813-826 (2009)). An elementary mode is neither a *plurality of chemical reactions* nor *an initial condition and amount of material used in the modeled biological system*. Accordingly, Sauro does not disclose or suggest the above-quoted feature of claim 1.

Kurata also does not disclose or suggest *a reaction table that depicts the plurality of chemical reactions and a species table that depicts at least one initial condition and at least one amount of material used in the modeled biological system*. The Examiner cites Figure 3 of Kurata for a tabular view (Advisory Action at page 1, first paragraph). However, the view depicted in Figure 3 does not include at least a *species table*. The species table of claim 1 *depicts at least one initial condition and at least one amount of material used in the modeled biological system*. Nothing in Figure 3 of Kurata depicts either the initial condition of the system or an amount of material used in the system. Figure 3 depicts only the “Players” in the system and the “Regulator Reaction Equations” that act on the players.

For at least the reasons set forth above, Applicants urge that Sauro and Kurata, alone or in any reasonable combination, do not disclose or suggest Applicants’ claimed *tabular view being adapted to receive the user commands and input to construct the model and display at least one of the plurality of chemical reactions, the tabular view comprising a reaction table that depicts the plurality of chemical reactions and a species table that depicts at least one initial condition and at least one amount of material used in the modeled biological system*. Therefore, Applicants respectfully request that the above 35 U.S.C. §103(a) rejection of claim 1 be withdrawn.

Claims 2-5 depend from independent claim 1 and, as such, incorporate all of the features of claim 1. Claims 2-5 are therefore allowable for the same reasons as claim 1. Moreover, the Examiner provides no justification for the rejection of claims 2-5. While the Examiner provides an analysis of the features of claim 1, the Examiner does not address the features of claims 2-5 at all. Applicants respectfully urge that dependent claims 2-5 recite additional patentable subject matter and respectfully request that the Examiner pass claims 2-5 to allowance.

Therefore, for at least the reasons set forth above, Applicants respectfully request that the above 35 U.S.C. §103(a) rejection of claims 2-5 be withdrawn.

Claims 8-11

Applicants' claim 8 recites:

8. A computer-implemented improved method for modeling a biological process comprising a plurality of chemical reactions, the method comprising:
- providing a graphical user interface;
  - receiving, via the provided user interface, user commands and data;
  - constructing, using the received user commands and data, a model of the biological process, the model being represented in a tabular view and a graphical view, *the tabular view being adapted to receive the user commands and input to construct the model and display at least one of the plurality of chemical reactions, the tabular view comprising a reaction table that depicts the plurality of chemical reactions and a species table that depicts at least one initial condition and at least one amount of material used in the modeled biological system*;
  - generating, using the constructed model of the biological process, dynamic behavior of the modeled biological process; and
  - displaying the dynamic behavior of the biological process on a display device.

Applicants respectfully urge that Sauro and Kurata, alone or in any reasonable combination, do not disclose or suggest at least a *tabular view being adapted to receive the user commands and input to construct the model and display at least one of the plurality of chemical reactions, the tabular view comprising a reaction table that depicts the plurality of chemical reactions and a species table that depicts at least one initial condition and at least one amount of material used in the modeled biological system*, which is present in claim 8.

As discussed above with respect to claim 1, neither Sauro nor Kurata discloses or suggests that *the tabular view comprising a reaction table that depicts the plurality of chemical reactions and a species table that depicts at least one initial condition and at least one amount of material used in the modeled biological system*. In Sauro and Kurata, there is no tabular format that includes a reaction table and a species table.

For at least the reasons set forth above, Applicants respectfully urge that Sauro does not disclose or suggest each and every feature of Applicants' claim 8. Therefore, Applicants respectfully request that the above 35 U.S.C. §103(a) rejection of claim 8 be withdrawn.

Claims 9-11 depend from independent claim 8 and, as such, incorporate all of the features of claim 8. The Examiner provides no justification for the rejection of claims 9-11, which recite additional patentable subject matter. Therefore, for at least the reasons set forth above with respect to claim 8, Applicants respectfully urge that the above 35 U.S.C. §103(a) rejection of claims 9-11 be withdrawn.

Claims 14-17

Applicants' claim 14 recites:

14. An article of manufacture having embodied thereon computer-readable instructions for improved modeling of a biological process comprising a plurality of chemical reactions, the article of manufacture comprising:

computer-readable instructions for providing a graphical user interface;  
computer-readable instructions for receiving, via the provided user interface, user commands and data;

computer-readable instructions for constructing, using the received user commands and data, a model of the biological process, the model being represented in a tabular view and a graphical view, *the tabular view being adapted to receive the user commands and input to construct the model and display at least one of the plurality of chemical reactions, the tabular view comprising a reaction table that depicts the plurality of chemical reactions and a species table that depicts at least one initial condition and at least one amount of material used in the modeled biological system*;

computer-readable instructions for generating, using the constructed model of the biological process, dynamic behavior of the modeled biological process; and

computer-readable instructions for displaying the dynamic behavior of the biological process.

Applicants respectfully urge that Sauro and Kurata, alone or in any reasonable combination, do not disclose or suggest at least a *tabular view being adapted to receive the user commands and input to construct the model and display at least one of the plurality of chemical reactions, the tabular view comprising a reaction table that depicts the plurality of chemical reactions and a species table that depicts at least one initial condition and at least one amount of material used in the modeled biological system*, which is present in claim 14.

As discussed above with respect to claim 1, neither Sauro nor Kurata discloses or suggests that *the tabular view comprising a reaction table that depicts the plurality of chemical reactions and a species table that depicts at least one initial condition and at least one amount of material used in the modeled biological system*. In Sauro and Kurata, there is no tabular view that shows a reaction table and a species table.

For at least the reasons set forth above, Applicants respectfully urge that Sauro does not disclose or suggest each and every feature of Applicants' claim 14. Therefore, Applicants respectfully request that the above 35 U.S.C. §103(a) rejection of claim 14 be withdrawn.

Claims 15-17 depend from independent claim 14 and, as such, incorporate all of the features of claim 14. The Examiner provides no justification for the rejection of claims 15-17, which recite additional patentable subject matter. Therefore, for at least the reasons set forth above with respect to claim 14, Applicants respectfully request that the above 35 U.S.C. §103(a) rejection of claims 15-17 be withdrawn.

#### Claims 20-23

Applicants' claim 20 recites:

20. A system for improved modeling of a chemical reaction comprising:
  - a modeling environment accepting user commands and input for constructing a model of a chemical reaction, the model being represented in a tabular view and a graphical view, *the tabular view being adapted to receive the user commands and input to construct the model and display at least one of the plurality of chemical reactions, the tabular view comprising a reaction table that depicts the plurality of chemical reactions and a species table that depicts at least one initial condition and at least one amount of material used in the modeled biological system*;
  - a simulation engine accepting as input the constructed model of the chemical reaction and generating as output an expected result; and
  - an analysis environment in communication with the simulation engine, the analysis environment displaying the expected result.

Applicants respectfully urge that Sauro and Kurata, alone or in any reasonable combination, do not disclose or suggest at least a *tabular view being adapted to receive the user commands and input to construct the model and display at least one of the plurality of*

*chemical reactions, the tabular view comprising a reaction table that depicts the plurality of chemical reactions and a species table that depicts at least one initial condition and at least one amount of material used in the modeled biological system*, which is present in claim 20.

As discussed above with respect to claim 1, neither Sauro nor Kurata discloses or suggests that *the tabular view comprising a reaction table that depicts the plurality of chemical reactions and a species table that depicts at least one initial condition and at least one amount of material used in the modeled biological system*. In Sauro and Kurata, there is no tabular view that shows a reaction table and a species table.

For at least the reasons set forth above, Applicants respectfully urge that Sauro does not disclose or suggest each and every feature of Applicants' claim 20. Therefore, Applicants respectfully request that the above 35 U.S.C. §103(a) rejection of claim 20 be withdrawn.

Claims 21-23 depend from independent claim 20 and, as such, incorporate all of the features of claim 20. The Examiner provides no justification for the rejection of claims 21-23, which recite additional patentable subject matter. Therefore, for at least the reasons set forth above with respect to claim 20, Applicants respectfully request that the above 35 U.S.C. §103(a) rejection of claims 21-23 be withdrawn.

### Claims 26-29

Applicants' claim 26 recites:

26. A computer-implemented method for integrated modeling, simulation and analysis of chemical reactions, the method comprising:

providing a graphical user interface for accepting user commands and data;

receiving, via the provided user interface, user commands and data;

constructing, using the received user commands and data, a model of a chemical reaction, the model being represented in a tabular view and a graphical view, *the tabular view being adapted to receive the user commands and input to construct the model and display at least one of the plurality of chemical reactions, the tabular view comprising a reaction table that depicts the plurality of chemical reactions and a species table that depicts at least one initial condition and at least one amount of material used in the modeled biological system*;

generating, using the constructed model of the chemical reaction, an expected result of the modeled chemical reaction; and displaying the expected result.

Applicants respectfully urge that Sauro and Kurata, alone or in any reasonable combination, do not disclose or suggest at least a *tabular view being adapted to receive the user commands and input to construct the model and display at least one of the plurality of chemical reactions, the tabular view comprising a reaction table that depicts the plurality of chemical reactions and a species table that depicts at least one initial condition and at least one amount of material used in the modeled biological system*, which is present in claim 26.

As discussed above with respect to claim 1, neither Sauro nor Kurata discloses or suggests that *the tabular view comprising a reaction table that depicts the plurality of chemical reactions and a species table that depicts at least one initial condition and at least one amount of material used in the modeled biological system*. In Sauro and Kurata, there is no tabular view that shows a reaction table and a species table.

For at least the reasons set forth above, Applicants respectfully urge that Sauro does not disclose or suggest each and every feature of Applicants' claim 26. Therefore, Applicants respectfully request that the above 35 U.S.C. §103(a) rejection of claim 26 be withdrawn.

Claims 27-29 depend from independent claim 26 and, as such, incorporate all of the features of claim 26. The Examiner provides no justification for the rejection of claims 27-29, which recite additional patentable subject matter. Therefore, for at least the reasons set forth above with respect to claim 26. Applicants respectfully request that the above 35 U.S.C. §102(a) rejection of claims 27-29 be withdrawn.

### Claims 32-35

Applicants' claim 32 recites:

32. An article of manufacture having embodied thereon computer-readable instructions for integrated modeling, simulation and analysis of chemical reactions, the article of manufacture comprising:

computer-readable instructions for providing a graphical user interface for accepting user commands and data;

computer-readable instructions for receiving, via the provided user interface, user commands and data;

computer-readable instructions for constructing, using the received user commands and data, a model of a chemical reaction, the model being represented in a tabular view and a graphical view, *the tabular view being adapted to receive the user commands and input to construct the model and display at least one of the plurality of chemical reactions, the tabular view comprising a reaction table that depicts the plurality of chemical reactions and a species table that depicts the initial conditions of the modeled biological system*;

computer-readable instructions for generating, using the constructed model of the chemical reaction, an expected result of the modeled chemical reaction; and

computer-readable instructions for displaying the expected result.

Applicants respectfully urge that Sauro and Kurata, alone or in any reasonable combination, do not disclose or suggest at least a *tabular view being adapted to receive the user commands and input to construct the model and display at least one of the plurality of chemical reactions, the tabular view comprising a reaction table that depicts the plurality of chemical reactions and a species table that depicts the initial conditions of the modeled biological system*, which is present in claim 32.

As discussed above with respect to claim 1, neither Sauro nor Kurata discloses or suggests that *the tabular view comprising a reaction table that depicts the plurality of chemical reactions and a species table that depicts at least one initial condition and at least one amount of material used in the modeled biological system*. In Sauro and Kurata, there is no tabular view that shows a reaction table and a species table.

For at least the reasons set forth above, Applicants respectfully urge that Sauro and Kurata, alone or in any reasonable combination, do not disclose or suggest each and every feature of Applicants' claim 32. Therefore, Applicants respectfully request that the above 35 U.S.C. §103(a) rejection of claim 32 be withdrawn.

Claims 33-35 depend from independent claim 32 and, as such, incorporate all of the features of claim 32. The Examiner provides no justification for the rejection of claims 33-35, which recite additional patentable subject matter. Therefore, for at least the reasons set forth

above with respect to claim 32, Applicants respectfully request that the above 35 U.S.C. §103(a) rejection of claims 32-35 be withdrawn.

Claims 37-39

Claims 37-39 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sauro in view of Kurata, and further in view of Shannon and Biospice. Applicants respectfully traverse the rejection.

Claim 37 depends from claim 1, and therefore includes each feature of claim 1. Claim 38 depends from claim 8, and therefore includes each feature of claim 8. Claim 39 depends from claim 14, and therefore includes each feature of claim 14. Each of claims 1, 8, and 14 includes a tabular view, *the tabular view comprising a reaction table that depicts the plurality of chemical reactions and a species table that depicts at least one initial condition and at least one amount of material used in the modeled biological system*. As noted above with respect to claims 1, 8, and 14, neither Sauro nor Kurata discloses or suggests this feature of claims 1, 8, and 14.

The addition of Shannon and Biospice fails to cure the factual deficiencies of Sauro and Kurata regarding the above-quoted feature of claims 1, 8, and 14. Shannon describes Cytoscape, an application for “integrating biomolecular interaction networks with high-throughput expression data and other molecular states into a unified conceptual framework” (Shannon at Abstract). The Examiner points to Figures 1 and 5 of Shannon as a tabular view (Advisory Action at page 1). However, neither Figure 1 nor Figure 5 of Shannon include *a reaction table that depicts the plurality of chemical reactions and a species table that depicts at least one initial condition and at least one amount of material used in the modeled biological system*.

Biospice is generally directed to an application to develop “a physically-grounded, molecular understanding of bacterial stress response,” “an infrastructure suitable for rapid deduction of pathway dynamics,” and “a theoretical and computational infrastructure [to] store, relate and model the data at different levels of abstraction” (Biospice at “Goals”). The Biospice presentation also does not disclose or suggest *a reaction table that depicts the plurality of*

*chemical reactions and a species table that depicts at least one initial condition and at least one amount of material used in the modeled biological system.*

For at least the reasons set forth above, Applicants respectfully urge that Sauro, Kurata, Shannon, and Biospice, alone or in any reasonable combination, do not disclose or suggest each and every feature of Applicants' claims 37-39. Therefore, Applicants respectfully request that the above 35 U.S.C. §103(a) rejection of claims 37-39 be withdrawn.

**CONCLUSION**

In light of the above, Applicants respectfully urge that all of the pending claims are in condition for allowance. Should the Examiner feel that a teleconference would expedite the prosecution of this application, the Examiner is urged to contact the Applicants' attorney at (617) 227-7400.

Please charge any shortage or credit any overpayment of fees to our Deposit Account No. 12-0080, under Order No. MWS-111RCE2. In the event that a petition for an extension of time is required to be submitted herewith, and the requisite petition does not accompany this response, the undersigned hereby petitions under 37 C.F.R. §1.136(a) for an extension of time for as many months as are required to render this submission timely. Any fee due is authorized to be charged to the aforementioned Deposit Account.

Dated: July 6, 2009

Respectfully submitted,

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